

TACTICAL OPERATIONS
MANUAL

AHICRO PROSE

2, Mark Prisce. Tetbury. Gloucestershire GL8 8DA Tet (0566)54326 3, 4734 Pricks 1, 1,740



PRESENTS



THE SUBMARINE SIMULATION

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A NOTE TROMPRED DEPONDER...

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We hope that this simulation will provide enjoyment for the new player, a sustained challenge for the avid gamer, and perhaps a glimmer of recognition to all those

glimmer of recognition to all those who knew or heard tales of those intrepid American undersea warriors of the Second World War. Happy Hunting!

Sid Main

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INTRODUCTION

SILENT SERVICE is a detailed simulation of World War II submarine missions in the Pacific. In place you pain the role of submarine capital, presents you with the same information, problems, and resources available to an actual sub capital included are numerous scenarios, options and play variations. Fixed established station acreens, numerous commands and realistic graphics and sound effects combine to provide a demantic level of realistim and Glavability.

As is detailed later, US submarines played a crucial role in stemming the lide of Japanees imperation and winning the var in the Pacific. The primary mission of the American Stient Service was to take on the Japanees Navy in their home waters and to neutralize the Japanees Merchant Marine. As submarine commander in this elite force, you will be evaluated based on the number and types of ships

The hist group of scenarios recreate actual historical situations and require a variety of different factics. They are useful for becoming acquainted with the mechanics of this simulation, practicing specific situations, or for quick games. The real test of a submaniane's skillhowever, are the Patrol scenarios, Here you will encounter an almost infinite variety of situations as you seek out and attack eventy conveys. With a limited number of torpodoes and fuel, your goal is to sink a maximum tonates of enemy shipoint and brink your situal societies for the section of the properties of the pro

As an accurate simulation of a real-life situation, there are numerous details, subtleties, and betures included in the simulation. The beginning player may safely refer the consideration of some of these factors until a few games are completed. The "Quick Start" section below is designed to allow experienced players to boot the program and play without reading the extensive documentation which follows: However, your enjoyment of this simulation will be enthanced by an understanding of the lactics, missions, equipment, and history of submarine combat as detailed in the remainder of this devument.

QUICK START

Like most people you are probably anxious to load up this product and get started. We offer this "quick start" to get you going with what we call the JG perspective. This is the view-point of a new Licutenant JG (Junior Grade), eager for battle, anxious to experience first-hand the challenge of submarine combat. When you decide to investigate this simulation in depth, you will need to throughly review the contents of this operations manual. But, for you JG's, grab your seabag, follow the short see profess below, and left go!

- Review the SUBMARINE CONTROLS and COMBAT CONTROLS sections to give you an idea of how to handle your submarine.
- Look over the CONNING TOWER MENU and BATTLE STATION SCREENS sections to understand the options available to you on each screen.
- 3. Locate your loading instructions and load the program into your computer.
- Choose Torpeda/Gun Practice or a Convoy Action scenario. (Stick to scenario 1 or 2 until you learn to maneuver and attack with your submarine.)
- Choose difficulty level 1 (trainee).
- 6. Turn of all reality level factors.
- 7. Good luck!

MISSION BRIEFING

TARGET IDENTIFICATION PRACTICE

A vital skill which each sub-captain must prosess is the ability to recognize and identify enemy lenges. If you select one of the damperous Palroll Mission scenarios you will be given a chance to refresh your target identification skills. Look up the ship requisated (example, alganess) "Type! Destroyer) in his Operation Manual. Determine which of the four ship sillhoutefet displayed on the present and the sillhoutest in the Operations Manual. Type the number of the matching sillhouteful (1, 2, 3, 4). If you correctly identify the ship you may proceed on your patrol. If you are incorrect, you will be re-assigned for further training and will proceed to Toroedo/Sup Precision at Missions Island.

LOADING INSTRUCTIONS

COMMODORE 64/128

Before loading, be sure your joystick is installed in port 2, nearest the back of the comoder.

If you have a Commodore 128, place the computer in C-64 mode by holding down the COMMODORE key while turning on the computer. C-64 and 128: type LOAD" 13 then press AFT LIRN.

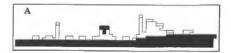
Leave the game disk in the disk drive at all times.

The function keys "F1" through "F8" refer to the keys f1-18 on the far right of the keyboard.

At some point, you may wish to clear the Submariner's Hall of Fame rankings. To do this, boot the machine, type LOAD "CLEAR"; Inten press RETURN. When the computer responds with "READY", type RUN then press RETURN.

COMMODORE AMIGA

Start your Amiga with KickStart (version 1.1 or higher), then eject the KickStart disk and insert Silent Service. It will load automatically. Leave the disk in the drive during the game. You can use either the mouse (in port 1) or a joystick (in port 2) to play the game.



MISSION BRIEFING

ATARIXL/XE

This program requires an ATARI 400/800/1200 XL/XE computer with at least 48K of memory and a disk drive. To load the program, remove all cartridges from the computer, insert the game disk in your disk drive, and turn on your system's power. The Joystick should be connected to the first Joystick connector.

The function keys "F1" through "F6" refer to SHIFT-1 (!) through SHIFT-8 (*).

The "F7" function may also be selected by gressing the START key.

ATABIST

If your computer has TOS already installed in ROM, simply place the Silent Service disk in your computer and town it on, Leave the disk in the driving diring play. If you have an early-version ST with no ROM TOS chips, insert your Alari TOS disk in the driver lists. Then turn on the computer. When the desktop appears, remover tha TOS disk and insert the Silant Service disk. Then press the SDS key to display the contents of the Silent Service disk. When the contents appear, use the left bound to double-click on the folder called AUTO. The AUTO Tolder will open to show a program called SERVICE PRIG. Outble-best on this program and you will be.

APPLE II Family

Plug in your joystick. You must have a joystick to play the game.

Press the CAPS LOCK key. Caps lock must be DOWN to play the game.

Place the game disk in the disk drive and turn on the computer. The game boots automatically Leave the disk in the drive while playing.

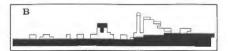
The "F7" function key is either the joyatick fire button or the RETURN key, depending on the selection screen. Follow the instructions on the screen.

To get the latest information on program and instructions updates, bool your Apple with a DOS 33 disk. Then remove it, Insert your game disk, type RUN MANUAL UPDATES and press RETURN.

IBM PC or TANDY 1000

NOTE: Your IBM PC must have a color graphics card to play this game. You may use either keyboard or joystick to play.

Place the game disk in your disk drive and turn on the computer. The disk will boot automatically. Leave the disk in the drive.



MISSION BRIEFING

OPTIONS

Upon loading, you will be allowed to select the scenario, options, and skill factors you wish to use:

SCENARIOS

There are three types of scenarios. "Torpedo/Gun Practice" places you outside the American base at Midway Island. Four old cargo ships are anchored there as torpedo and gunnery practice targets. The second set of scenarios." Convoy. Actions, "recreate various actual submarine attacks on a convoy. "War Partols", allowy out to command an entire partol, beginning at the submarine bases at Midway. Brisbane, or Figmantie, continuing through a number of convoy actions, and conduction with a nutrit to base.

SKILL LEVELS

You may select from one of loar skill levels: "MIDSHIPMAN".
"IEUTENANT" "COMMANDER" or "CAPTAIN" The skill level affects the accuracy pede ruse, damage austained from deight charge attacks, the skills of engine stand so and so accordance as well as other factors. The skills of engine standard to provide a challenge for beginning players.
"MIDSHIPMAN" level is designed to provide a challenge for beginning players.
"CAPTAIN" level is intended for the expert skyld view. Press 1, 2, 3 or 4 to chance the skill level.

REALITY LEVELS

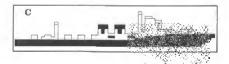
In addition, you may customize the simulation with various "reality levels". Each level introduces an element which makes the simulation both more realistic and more difficult. To select the reality levels, use the joyslick to move the flashing asterisk and press the trigger to toggle the YES/NO indicator.

1) LIMITED VISIBILITY

If this level is selected enemy ships which are beyond radar/sonar range will not appear on the map displays. Enemy ships which were detected but have moved out of range will blink slowly at their last known position. If this level is not selected, all enemy ships will appear on the map displays regardless of their range or location.

2) CONVOY ZIG-ZAGS

If this level is selected enemy convoys will "zig-zag" (change course) at regular intervals. If this level is not selected, cargo ships will steam straight ahead unless they are attacked by torpedoes or encounter land masses.



MISSION BRIEFING -

3) DUD TORPEDOES

If this level is selected some of your torpedoes may be duds, especially during the years 1942-1943. Dud torpedoes may hit the enemy but will not explode, only the solash will be seen.

4) PORT REPAIRS ONLY

If this terel is selected repairs will no longer be accomplished automatically while in battle or on patrol. Once an item of major equipment is damaged, it may not be remained.

5) EXPERT DESTROYERS

If this level is selected certain enemy convoys will be escorted by "expert" destroyers. These escorts are more persistent and have better trained sonar operators.

6) CONVOY SEARCH

If this level is selected convoys will not always appear within radar range. You will need to search them out. Far off convoys are best sighted by performing a 360 degree perinscope/binoular sweep of the horizon.

THANGLE-ON-BOW INPUT

It this level is selected the computer will no longer calculate the "Angle on the Bow" for lorped shots. You must enter the angle yourself based on periscope observations. Be sure you understand the workings of the Torpedo Data Computer before attempting this level. Recommended for experienced players only.

DIFFICULTY LEVELS

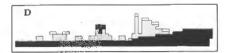
The skill level and reality levels you select combine to produce an overall difficulty factor from 1 fo 9. This difficulty factor and the tonnage which you sink will determine your ranking in the "Submariner's Hall of Fame" at the conclusion of your mission.

Once you are satisfied with the skill and reality levels, press "F7" to load the remainder of the game and begin play.

Additional data may be loaded at this time. When loading is completed you will appear in the conning tower (or the Patrol Navigation Map if you selected at War Patrol scenario) and the action will begin?

TERMINOLOGY

Port: The left side of the ship.
Starboard: The right side of the ship.
Bearing: The direction you are looking.
Heading: The direction your ship is going.



SIMULATION SPECIFICATIONS

CONTROLS

All of the following controls have keyboard equivalents that can be found on the Keyboard Commands chart on the inside front cover of the manual.

WAR PATROL CONTROLS

See the WAR PATROL BATTLE STATION description.

SUBMARINE CONTROLS

IN PRIVEISE.

Submarine controls are available primarily at the Maps and Charts or Gauges and Instruments battle stations.

Raise or Lower Periscope: Press the "P" key on the keyboard, (Arai ST and Amage. You can also select the periscope con on the mouse menu.) This command raises scope if it's down, and lowers it if it's up. It also sets the visual bearing (the direction you're looking) to be the same as the suisk heading (the infection for the suisk heading (the direction for the suisk heading (the nicection flux but) and the same as the suisk heading (the nicection flux but) and the same as the suisk heading (the nicection flux but) as only if you can use the periscope (in daylight only) down to a maximum depth of 44 feet.

Throttle (Speed): Keys "0" through "4" control the sub's speed. "0" = all stop (silent running): "1" = 1/3 speed: "2" = 2/3 speed; "3" = Full speed; "4" = Flank speed. (Alari ST and Amiga: You can also select speed by clicking on the throttle icon in the mouse mean.)

Reverse: Press "R" on the keyboard to reverse the engines. (Atari ST and Amiga. You can reverse engines by clicking on the "Reverse" icon in the mouse menu.) To change speed while in reverse, adjust the throttle, then select Reverse again. Note that the turning effect of the nudders is reversed when the such is moving.

Dive: To dive, pull down or toward you ("south") on the joystick. (If using a mouse, click on the downward arrow of the sub-portiolicen.) This causes the sub-to increase its depth. When you have reached the desired depth, cancel the command by pushing up or away ("north") on the joystick. (Mouse: Click the center or upward arrow of the sub-control icon.)

In scenarios before August, 1943 your maximum safe depth is 300 feet; after August, 1943 your maximum safe depth is 425 feet.

Surface: To surface, push up of away ("north") on the joystick, if tusing a mouse, click on the upward arrow of the sub-control icon.) This causes the sub-to-rise toward the surface. When you have reached the desired depth, cancel the command by pulling down or toward you ("south") on the joystick. [Mouse: Click the center or downward arrow of the sub-control icon.]

Left Rudder: Press the joystick to the left "west") for Left Rudder; press signin for Full Left Rudder (fitusing a mouse, click on the left arow of the sub-control icon.) This turns the sub-forward the left [port); if looking on the Map screen, you will see the sub-turn counterfoldswiss. To cance, press the joystick to the right (Mouse click on the center or left arrow of the sub-control icon.) Note: Turning the sub-changes is heading.

Right Pudder: Press the joystick to the right ["east"] for Right Rudder, press again Not Right Full Rudder, (If using a mouse, click on the right strow of the subcontrol icon.) This turns the sub-toward the right (starboard), if looking on the Mapscreen, you will see the sub-turn clockwise. To cancel, press the joystick to the left. (Mouse: click on the center or left arrow of the sub-portex lock.)

- 1

Cancel: To cancel all turn and dive commands, press the RETURN key. (Atari

SY and Amiga can cancel by clicking in the center of the sub control icon.]

Blow Emergency Tanks: Press CONTROL E to blow emergency tanks. This can halt an otherwise fatal drive, and usually brings your sub to the surface. You may perform this only once per engagement.

COMBAT CONTROLS

Combat controls are available primarily when at the Periscope/Binoculars battle

Identify: Press the "I" key to identify the target under the crosshairs in the periscope/binoculars. (Atari \$T and Amios can identify by clicking in the IO area.)

Fire Topedor Press the "T' key to fire a forpedo at the target under the white crosshairs (Atari ST and Amiga can fire by clicking on the topedo icon.) So w or aftrubes will be selected automatically depending on which faces the target more directly. Note that four topedoes and gun shells (total) may be active at any one time. If a firth short sine for before the first at finished, the first will end prematurely and the new shot is faunched. See the "Torpedoes" section of SUBMARINE TACTICAL OPERATIONS for more details.

Fire Deck Gun-Press the "G" key to fire the four-inch deck gun at the target under the white crosshars. (Alan St and Amiga can fire the gun by clickang on the deck gun con.) The gun may be fired only when your sub is on the surface. The range is automacially set to the TDC range of the target at which you are aiming. See the "Deck Gun" section of SUBMARINE TACTICAL OPERATIONS for more details.

Increase Gun Deflection: Press the "+" key to increase deck gun deflection by 25 yards (Atam XL/XE, Press the ">" key). Each additional press adds 25 more yards to the deflection. You want to increase deflection when the target is moving away from you.

Decrease Gun Deflection: Press the "-" key to decrease deck gun deflection by 25 yards (Atan XL/XE: Press the ">" key). Each additional press subtracts 25 more yards from the deflection. You want to decrease deflection when the target is moving toward you.

Rotate View Left: Press the joystick left or rotate the view left on the Periscope Bindoulars or Bridge screens. Mouse: place the mouse arrow on the left handle or left horizon and hold down the left button.) To increase the rotation speed, hold down the fire button while pressing the poystick over. (Mouse hold down both buttons.) Rotating the view changes its bearing.

Rotate View Right: Press the joystick right to rotate the view right on the Periscope Binoculars and Bridge screens. (Mouse place the mouse arrow on the right handle or right horizon and hold down the let button.) To increase the rotation speed, hold down the fire button while pressing the joystick over. (Mouse) hold down both buttons.)

Angle-on-Bow Entry: If playing with this reality level, you should enter an angleon-bow value from -180 to -180 believe you fire a torget at the target. Enter a negative value if the sub's line of sight is to the left (port) of the target's heading (from the larget's standpoint); use a positive value if the sub's tine of sight is to the right is start board of the target's heading. To begin the entry, press the "A" key. Change the angle shown by holding the joystick left or right: left for negative, right for positive (IBM: use the left right cursor keys.) When you have reached your chosen angle, press the fire button. You may then fire a broade at that angle.

(Atari ST and Amiga: The AOB gauge appears directly beneath the viewing area. Use the mouse to point to a position on the scale, or use the joystick to move the marker on the scale. In either case, you'll see the exact angle-on-bow value in the digital readout below. Press the left mouse button or fire button to select a value in

Release Debris: Press the "7" key to release debris and oil. These rise to the surface and may convince the enemy your sub has sunk. You may release debris only once oper engagement

TIME AND SCALE CONTROLS

Wait (Pause): Press the "W" key to pause the simulation — press any key to continue. You may also pause by selecting the Conning Tower screen.

Faster Time: Press the "F key to increase the time scale, thus causing the simulation to move more rapidly. (Amiga only: click on the clock icon.) Each subsequent key press doubles the speed, to a maximum of 32 times real time speed (Three key press doubles the speed, to a maximum of 30 times real time speed (Three key pressed). See the "Time Scalins' section for more details.

Normal Time: Press the "N" key to return to the normal time scale. (Amiga only: click on the "N" below the clock icon.) You automatically naturn to normal time when detected by the enemy or when you fire a topped or the deck quin.

Zoom: Press the "Z" key to expand the situation map on the Maps and Charts screen. (Atari St and Amiga: Click on the large square in the Zoom icon.) This gives you a closer took at nearby ships and terrain:

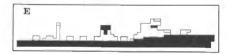
Un-zoom: Press the "X" key to compress the situation map on the Maps and Charts screen. (Atar: \$T and Amiga: Click on the small square in the Zoom icon.) This gives you a wider view of ship locations and land areas.

Software Concealment (IBM only.) Press the "" (apostrophe) key to display a bogus "PROCESSING PLEASE WAIT" message. This locks out the keyboard unfill the "" key is pressed again. If you're playing at the office and the boss walks by, this can be very handy!

Volume Control: (IBM only.) Press the "V" key to turn off the engine sounds; press again to turn off all sounds. A third press will restore all sounds.

WAR PATROL

Some versions of the software refer the user to this page of the manual for information on the War Patrol Navigation Map screen. In this edition, that information can be found on page 13.



CONNING TOWER MENU SCREEN

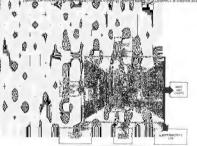
The conning tower soreen acts as a menu screen — from this screen, you may select any of the fire idealined battle station screens; the attack periscope, the bridge, the map plot, critical passes and densinger eponds (all of these are discoloritions). The station of the stati

When you are at the conning tower screen, the simulation is paused. Note that some selections are unavailable under certain conditions, e.g. the bridge is unavailable if you are under water, etc.

You may also select two special functions from this screen. If you are playing a farming of Controy Action scenario, the "End of Game" function (joystick or mouse down and left) will end your mission. If you are playing a War Patrol scenario, the "Continue Patrol" function (joystick or mouse down and left) ends the current convey battle and returns you to the patrolling screen. You cannot end the battle if you are being fracked by enemy escorts, have torpedoes active, or if an enemy ship is still inkino.

The "Quartermaster's Log" option (joystick or mouse down and right) is used

Site these selections of the selection of the sele



MOVE JOYSTICK TO SELECT PRESS FIRE BUILTON TO ACTIVATE

12

BATTLE STATIC ASCALE AS

SILENT SERVICE contains multiple Battle 900 configuration of the service of the s

WAR PATROL NAVIGATION MARCH TO STATION (War Patrol scenarios only)

When you select a War Patrol scenario you start out on this screen, which displays a map of the western Pacific Josen. You are free to explore any area of the map. Your ship its a tiny black dot near your starting port of Fremantle on Exmouth Gult. Brisbane, or Midway (see the map on pages 24 and 25). The patrol screen simulates the lime required to proceed from your hastel to enemy-controlled waters as well as the patrolling activity between engagements. (A typical patrol lasted up to two months).

Moving on the War Patrol map: If using a joystick, push the stick in the direction you wish to move. If using a mouse, your ship will always move toward the mouse arrow. Move the arrow to the desired location and the ship will sait toward to

Time moves quickly while patrolling. The ocean or screen border changes from light to dark blue to represent day and night (Apple version: text messages indicate nassage of time)

Finding the Enemy: When the ocean or screen border turns red, you've apotted a convey (Apple version "CDMVOY SIGHTED") message appears). Press the fire button (or either mouse button) to exift from parto if you want to engage in battle. Note that enemy which are generally found along the heavily travelled convoy routes (see map on pages 24 and 25) and close to land. Valuable tanker and froop ship convoys are more likely to be found near Japan.

If you get the urge to explore a particular area of the map, you may do so, even if no comoys have been sighted and you are not at your base. Simply press the fire button focati war particular area.

Getting Home: The submarine bases at Michay Island, Fremantle and Brisbane are indicated by flashing dots. When you have reached your base and the ocean or screen border turns green, you can return to port (Appie version: "AT BASE" message appears). Press the fire button for the right mouse button it on the patrol and record your soons in the Submariner's hall of Fame.

important Note: NO OTHER CONTROLS function on the patrol navigation screen. To make other controls work you must exit the war patrol.



MAPS AND CHARTS BATTLE STATION

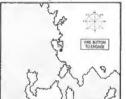
The maps and charts screen displays information available from the navigator. and the tracking party. Man information, visual sightings, radar and sonar are combined on this screen to show the location of your submarine. to pedoes, and all known enemy shins. Your submarine is represented by a black dot, torpedoes, and enemy ships are white dots, green areas represent land masses and islands. NOTE: sometimes there are enemy ships out there that you have not yet detected. These undetected ships do NOT appear on the map. Your lookouts aren't always reliable - it's wise to leave the mans bable station and look around the horizon with the periscopes and binoculars yourself.

If an enemy ship is no longer within sighting range, a dot will flash slowly at its last known position. If more ships and torpedoes are active than the tracking party can handle, the most distant objects may be dropped from the map

Zoom: You may enlarge or shrink the scale of the map to any of four levels of detail. by using the Z and X keys (optional for Atari ST and Amiga: click on the Zoom/Unzoom icon with the left hutton). The initial man shows the entire Western Pacific. The Patrol Area map shows a 500 by 300 mile area. Zoom again and you will see the

Navigation Man which shows 60 by 40 miles. The most detailed map is the Attack Plot man which shows an area of 8 miles by 5 miles. On the Attack Plot, ships. are displayed with small "tails" which indicate the direction each ship is moving (Apple version: the shins have no fails. but each has a small dot at the bow that indicates which way the shin is headed).

Controls Available: All Supresrine and Time and Scale controls. nius "Release Debns"



BRIDGE BATTLE STATION

You may select this screen only if your sub is on the surface. The bridge screen provides a wide-angle view of nearby ships, islands and coastline. This screen also

displays the current visibility conditions (good, average or poor).



Decrease Deck Gun Deflection (NOTE: firing the deck mun from the bridge is not recommended use the Periscopal Binoculars haltle station I On Atan ST and Amiga versions, the Submanne Controls are available in the mouse menu

SIMILII ATION SPECIFICATIONS

Bearing: Notice that the "Bearing" changes as you rotate your view. Searing is the direction in which you are looking expressed in compass degrees. Bearing 000 indicates you are looking North 090 is East 180 is South and 270 is West

PERISCOPE/BINOCULARS BATTLE STATION

This screen displays the view through the attack periscope during daylight/ dusk/dawn and the view from the bridge Target Rearing Transmitter biggerulars at night. The viewing area shows an enlarged image of visible ships and land. This screen may be selected when the sub is on the surface, or at periscope depth (44 feet or less) in daylight. (The attack periscope did not transmit enough light to be used at night 1

Controls Available: All Combat controls, plus Wait, Faster Time and Normal. Time, (Atan ST and Amica, Submarine Controls are available in the mouse menu.) Torpedo Data Computer:

When the crossbairs turn white the Torpedo Data Computer is activated and target tracking is displayed The TOC displays the range to the target, the target's speed, "angle on the bow" the computed gyro lead angle necessary to hit the shin. and the target's course. (Course is not available if you have selected the "Enter Angle-On-Bow" reality level. 1 You may fire a torpedo by pressing the "T" key fire the deck our by pressing the "G" key, or request target information from the identification party by pressing

BEARING: 243 TORPEDO DATA COMPUTER TARGET BANGE 2518 74609 TARRETTO TARGET STREET R KNOTS ANDLE DIN BOW D71 DEG TONKER DYBO ANGLE: -009 DEG 7000 TONS BOWTORPEDO FIREDI 233 TRACK

the "I" key. (Atari St or Amigs. You may control these functions with the mouse by selecting the torpedo or deck gun loons to fire weapons, and clicking in the target (Darea for identification.)



MAPS AND CHARTS BATTLE STATION

The maps and charts screen displays information available from the navigator and the tracking party. Map information, visual sightings, rader and sonar are combined on this screen to show the location of your Johnshine, terpedoes, and all known enemy ships. Your pubmants is represented by pixtlagkt 6th, torpedoes and enemy ships are white dots, green areas repensation? You pixtlagkt 6th, torpedoes and enemy ships are white dots, green areas repensation? You before polyed elected. NOTE: sometimes there are enemy ships out there in a typu take polyed elected. These undetected ships do NOT gapear on the map. Your resverable in a laws; reliable—if is was to leave the maps battle station and footcarruins the horizon with the persiscopes and bimocular yourself.

If an enemy ship is no longer within sighting range, a dot will flash slowly at its last known position. If more ships and torpedoes are active than the tracking party can handle, the most distant objects may be dropped from the map.

Zoom: You may enlarge or shrink the scale of the map to any of four levels of detail by using the Zand X keys (optional for Atari ST and Amiga, click on the Zoom/Unzoom icon with the left button). The initial map shows the entire Western Pacific. The Patrol Area map shows, a 500 by 300 mile area. Zoom again and you will see the

Navigation Map, which shows 60 by 40 miles. The most detailed map is the Attack Piot map, which shows an area of 8 miles by 5 miles. On the Attack Piot, ships are displayed with small "rails" which indicate the direction each ship is moving [Apple version: The ships have no tails but each shap is made as a small dot at the bow that indicates which way the ship is headed).

Controls Available: All Submarine and Time and Scale controls, plus "Release Debris"

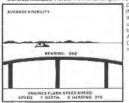


BRIDGE BATTLE STATION

You may select this screen only if your sub is on the surface. The bridge screen provides a wide-angle view of nearby steps, islands and coastline. This screen also

displays the current visibility conditions (good, average or poor).

Controls Available: Rigiste View left and right, Fire Deck Gun and Increase and



e Deck Gun and Increase and Decrease Deck Gun Delfection (NOTE: firing the deck gun from the bridge is not recommended use the Périscopa Binoculars battle station.) On Atan ST and Amiga versions, the Submarine Controls are available in the mostes menu.

SIMILITATION SPECIFICATIONS

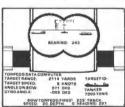
Bearing: Notice that the "Bearing" changes as you rotate your view. Bearing is the direction in which you are looking expressed in compass degrees. Bearing 000 indicates you are looking North, 99 is East. 180's South and 270 is West.

PERISCOPE/BINOCULARS BATTLE STATION

This screen displays the view through the attack periscope during daylight/ dujks (dawn and the view from the bridge Target Dearing Transmitter binoculars at night. The viewing area shows an enlarged image of visible ships and land. This screen may be selected when the sub is on the surface, or at periscope depth (44 ted or less) in daylight. (The attack periscoped did not transmit enough light to be used at nick.)

Controls Available: All Combet controls, plus Wait, Faster Time and Normal Time. [Atan ST and Amiga. Submarine Controls are available in the mouse menu.) Torpedo Pata Computer:

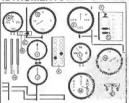
When the crossbairs turn white. the Torpedo Data Computer is activated and target tracking is displayed The TOC displays the range to the target, the target's speed, "angle on the bow" the computed ovrollead angle necessary to hit the shin. and the target's course. (Course is not available if you have selected the "Enter Angle-On-Bow" reality level.) You may tire a torpedo by pressing the "T" key fire the deck gun by pressing the "G" key, or request target information from the identification party by pressing



the "I" key. (Atari St or Amiga. You may control these functions with the mouse by selecting the torpedo or dock gun foons to fire weapons, and clicking in the target ID area for identification.



INSTRUMENTS AND GAUGES



This screen displays vital status information. The straight up position for all gauges represents a zero value, with increasing values in the clockwise direction. The primary instruments and gauges are:

- (A) BATTERY LEVEL a gauge indicating the amount of electricity remaining in the battery. The battery is used for submerged cruising and is gradually recharged when on the surface. If your battery is with autised by our libe unable to more while underworker. A fully charged battery will allow one hour of high speed maneuvering underwater, five or six hours at six with seveneds.
- (B) BATTERY CHARGE LIGHT Indicates the battery is being charged.
- (C) BATTERY IN USE LIGHT Indicates the battery is being drained.
 (D) SPEED a gauge endicating the sub's speed through the water. Maximum surface speed is 20 knots, maximum submerged speed is 10 knots.
- (E) DEPTH a gauge showing the current depth below the surface. Periscope depth is 44 feet or less. Note that depth measured in feet below the surface; zero-depth means the sub-its on the surface.
- (F) PERISCOPE INDICATOR this indicator in the upper left of the forced status box is white if the periscope is reised, black if down.
- (6) TORPEDO READY INDICATÜR a sories of lights indicating which forward and all toppedoes tobbe are rearly for firing. Given indicates ready, black indicates empty. Torpedo reloading is performed surformatically and requires about 19 game minutes per tyte. The green number under each column of torpedoes indicates how many bow waft torpedoes remain in addition to those already in the tubes. The red number above the indicator indicates how many facts gun arbeits remain.
- (H) FUEL LEVELS three vertical tubes showing the dieselfuel fevels in the three main tanks. The dieselfuel floats on top of the water. The fubbs show the amount of fuel foliack and water white's in each tank. Full lenks allowed for 50 to 60 days cruiping.
- DEPTH UNDER THE KEEL a gauge showing the depth from your sub to the ocean bottom. When this gauge reads zero you will run aground. Maximum reading on this sauce is 500 sept.
- (J) WATER TEMPERATURE a gauge showing the temperature of the water outside the submanne. A blue diat hand indicates that the submarine is below a thermal gradient lawer.
- (K) "CHRISTMAS TREE"—light indicating the status of all hull openings. Green light indicates closed, red light indicates open. Hull openings are closed automatically when you give the order to dise.
- (L) COMPASS indicates the direction the submarine is heading.
- IMI THROTTLE 0-4 throttle settings All stop, 1/3, 2/3, full and flank speeds
- (N) CLOCK shows the time of day. The sweep hand shows MINUTES and the number primed below is the HOUR (0-23) in 24 hour time. Dusk in the Pacific is from 7:00 PM (Hour 19) to 8:00 PM Hour 20), dayn is from 5:00 AM to 8:00 AM.
- (O) DIVE BUBBLE a horizontal tube showing whether the submarine is diving or

DAMAGE REPORTS BATTLE STATION



This screen indicates the nature of any damage to the submarine. Damage may be caused by depth charge attacks or enemy gunfire. Types of damage include. Bow/Alt torpedo damage: these torpedo tube doors have been damaged. The torpedoes will not fire.

Periscope damage: the postocrape bossing has been damaged. The periscope cannot be lowered or raised.

Dive Plane damage: the bow shot Wern slice planes have been damaged. The submarine will only dive or subtree at the sits normal rate

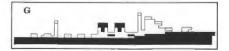
Fuel Leaking: the external rug burks ave looking. Fuel will be consumed at twice the normal rate. In addition, fuel rising to the surface will make the submarine easier to detect by enemy destroyers.

Engine Damage: the main diesel engines are damaged. Surface speeds are reduced by half.

Machinery Damage: internal pumps and engines are damaged. The extra noise make the enemy's sonar tracking easier.

Battery Damage: batteries are used up at twice the normal rate when submerged. If the "Port Repairs Only" reality level is not selected, repairs are attempted by the crew automatically.

If your sub is taking on water, the leakage rate is indicated in gallons per second (GPS). Leakage will often cause your sub to descend, although the dive planes may be able to counter-act the dive. This information is provided in the top right hand side of the Damage Reports Screen.



SUB CONTROL DIAGRAM and STATUS AREA

The bottom few lines of most battle station screens contain the sub-control diagram and the status area. (The Atari ST and Amiga versions have mouse menus - see below.) The sub-control diagram on the left is a rear view of your sub-with the current rudder, dive plane and throttle settings displayed. Left and right arrows. indicate left/right rudder, up and down arrows indicate up/down dive planes, and a number 0-4 shows the throttle setting. The bottom line displays your current speed (in knots), death (in feet) and heading (in degrees). The top line is used to keep you informed of status messages from the crew

Mouse Menu: On the Atari ST and Amiga versions, icons control rudders. depth, penscope up/down and rotate view, zoom/un-zoom, throttle (speed) and time scale. Use your mouse to point to the action desired and press the left mouse button to select the command.

The icon that controls rudders and depth is a four-way arrow. Select the top or bottom arrow for sudences or deepes. Select the right or left arrow for right or left rudder, select it twicks its 1000-32 bilder or left full rudder. Select the center of the arrow to cancel all do the last and a deractions.

MESSAGES and SOUNDS

You may receive managed to a sign time from various members of the crew. Rudder, throttle, and periscope confirmands will be acker assessed, Votos Instead hear the sound of your own engines, nearby ships, and gross the site of there are messages and sounds with special meanings?

SONAR REPORTS DESTROYERS CLOSING, ("ping" coered.

The sonarman is reporting that the submarine has become consumptions of the consumption o SODRE

SONAR REPORTS DEPTH CHARGES DROPPED. ("SCHARLES DRUPED. The soundman is reporting that a destroyer overhead and destroyer averhead into the water.

DEPTH CHARGES EXPLODING! (explosion sounds)

LOOKOUTS REPORT DESTROYERS FIRING. (gun a) 2003 Lookouts on the bridge are reporting that enemy destroyout as the particular to firing at the sub.

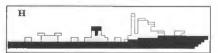
SHELL HIT! SUB DAMAGED. (whistling explosion sound)

Your submarine has been hit by a destroyer's shell. Damage has been sustained. BOW (AFT) TORPEDO FIRED! 135' TRACK, (torpedo launch, torpedo motor sounds)

One of your torpedges has been launched in the direction indicated.

DECK GUN FIRED! (oun fire sound)

You have fired your deck oun in the direction indicated



SONAR REPORTS DISTANT EXPLOSIONS, (distant explosion sound)

The sonarman 27602 The a torpedo or pun hit. WARNING: YEST DEPTHEXCEEDED. (hull creaking sound)

You have exceeded the season rated test depth, small leaks are starting. (Check the Damage Reports screen 1

WE HAVE BUN AGROUND! (grinding sound)

Your sub is scraping the bottom. You will be stopped until you rise off the bottom. REPAIRS COMPLETED

Work parties report that they have repaired a damaged component; check the Damage Reports screen

BLOW EMERGENCY TANKI (alarm sound) The emergency boulancy tank has been emotied.

RAMMED BY ENEMY SHIP! (orinding sound)

You have been rammed by an enemy ship and will start to sink. This is usually fatal.

TIME SCALING

In order to ensure accuracy, all ship movement, sightings, torpedo runs, and dive rates are recalculated every two seconds of simulated game time. However, under most conditions it is desirable to speed up the action somewhat. Normally the simulation proceeds at four times real time; one minute of game time takes 15 seconds. If the "F" key is pressed, the time scale is doubled.

Repeated pressing a way a gar you as the time scale up to a maximum to be a maximum to the scale up to a maximum to a maxi game time of test 25 date 1, 15 date 1, 15 date 1, When the "N" command 2 date 1, 15 dat

END OF MISSION, SCORING, and RANKS

Convoy As a series of Convoy As a series the "End of Game" option. War Patrol 1990 to 1990 to 1990 to 1990 to 1990 bases. Either mission type ends if you and other school sold of the 2 you will see a screen displaying all ships which you have sunk and your final rank

Marry patrols failed to sink any enemy ships, while successful captains often sank over 15,000 tons. Your mission is to sink the highest tonnage of shipping without losing your sub. The simulation records your sinkings automatically. Your ranking will be based on tonnage sunk, difficulty level, and reality levels chosen. The higher the levels, the more value your tonnage is given. All players will rank at least Ensign, Higher levels are Lieutenant JG. Lieutenant 1 jeutenant Commander Commander, Captain, Vice-Admiral, Admiral, Fleet Admiral, and ultimately WGSC (World's Greatest Submarine Captain)!

Press "F7" from this screen to embark on a new mission.

SUBMARINERS' HALL OF FAME

If you have a successful cruise, you will be prompted to enter your name. Type your name on the keyboard, then press RETURN. The Hall of Fame records the best rankings achieved and also includes real-life tonnages sunk by five submarines in actual war patrols. Remember that your rank is computed from both tonnage sunk and the difficulty factors used.

CONVOY ACTION SCENARIOS

Convoy action scenarios are shorter scenarios which place you in specific historical situations. They are useful for becoming acquainted with the features of this simulation, exections seediffe tactics, or when time is short.

PLUNGER IN THE INLAND SEA (LL Commander D.C. White) Day/Submerged

Jan. 18. 1942 Latitude 33-30 N. Longitude 135-00 E.

Jan. 18, 1942, Latitude 33-30 N, Longitude 135-00 E. Radar, Steam Tornedoes, 300 ft. huli

The USS Plunger, patrolling off the southern coast of Japan, sights an escorted

cago ship steaming assal ships speed. This scenario gives you the opportunity to set up to topped timing solution against a moving ship. Here were though the Topped of The Computer calculates the correct lead give angle to thit the target. It is often a good idee to fire a spread of totoped on a case your target changes course unexpectably.



WAHOO VS. CONVOY (Lt. Commander "Mush" Morton) Day/Surface

Jan. 26, 1943, Latitude 2-37 N, Longitude 139-42 E.

Radar, Steam Torpedoes, 400+ ft. hull
Off the New Guines coast, USS Wahoo sights a small, Jacanese convoy. The

Off the New Guinea coas situation is a submariner? dream: an unescorted convoy including a troop ship and a targe oil tanker. However, the convoy has radioed for help and a destroyer is on the way! Your objective is to strike quickly and cause as much damage as possible. Be sure to use your aft toneedoess! Your Dow

tubes are exhausted.



SIMILII ATION SCENARIOS -

HAMMERHEAD AT BORNEO (Commander J.C. Martin) Night/Radar

October 1, 1944, Latitude 5-30 N, Longitude 116-11 E.

Radar, Steam Torpedoes, 400+ ft. hull
Suitadar picks up a large excepted convolves the USS Hammedhead naturals the

northern coast of Bornen The tanker, one of Japan's dwindling handful remaining at this stage of the war. should be your primary target. This scenario introduces night combat against an escorted conyou You should take care to avoid being spotted as long as possible; use moderate speeds, keep a minimum profile toward the escort, and try to time your attack so that the escort is on the other side. of the convoy.



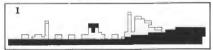
SEARAVEN AT TOAGEL MLINGUI (Commander H. Cassedy)

End around January 13, 1943, Latitude 9-12 N, Longitude 130-38 E.

Radar, Steam Torpedoes
Somewhere between the Philippine Islands and the Japanese naval base at

Truk Lagoon, USS Seataven comes across a northbound convoy. You are in a bad position; astern of the convoy in daylight. A careful "end-around maneuver is recommended. Be sure to use the time scaling feature to speed up your run around the convoy.





SIMULATION SCENARIOS

TAUTOG AT NIGHT (Lt. Commander Sieglaff)

Radar/Visual Night March 16, 1944, Latitude 42-25 N. Longitude 144-55 F.

Radar, Steam Torpedoes, improved detonator, 400+ ft, built Off the eastern coast

of Japan, USS Tautog encounters a Japanese convoy Night attacks depended year much on the prevailing visibility conditions. During poor visibility, a low lying sub could safely close with its target on the surface. If visibility was good however, somewhat more caution was required.



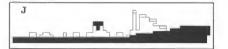
GRAYBACK IN THE CHINA SEA (Lt. Commander J.A. Moore) Submerned Bader

October 21, 1944, Latitude 26-48 N, Longitude 124-56 E, Redar, Electric Torpedoes.

400 - ft. huti

A very difficult situation. Three radar-equipmed escorts are quarding the convoy! Your best hope is a dawn or dusk perisonne attack





SIMULATION SCENARIOS -

(ATABLST AND AMICA ONLY) CAVALLA HITS THE JACKPOT (Commander H.J. Kossler) Day/Submerned

June 19, 1944, Latitude 11-50 N, 137-57 E

Radar, Electric Torpedoes, 400+ ft, hull Cavalla, patrolling pear Pelau on her maiden versage, makes an exciting discovery: a group of Japanese warships, including two crusters and an aircraft.

carrier, is approaching at high speed! A warshay convoy is faster than a submarine. so vou'll only have one change to sink or cripple. the big ships before they sweep on past. Your prime target should be the carrier but if your position is too unfavorable, go for one of the cruisers. Be wary! The escorts are alert and dangerous, and the cruisers are

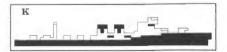
deadly if you surface.

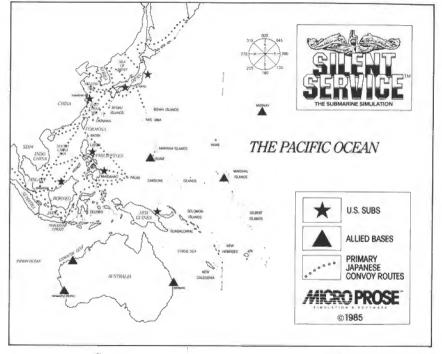


WAR PATROL SCENARIOS

The War Patrol scenarios are the true test of a submanner's skill. Your mission is to scour the Jacanese convoy lanes; to find, attack and sink the maximum tonnage. of enemy shipping. You will encounter a wide variety of situations, poportunities and dangers. Note that each submarine is differently equipped - your tactics should take into account the strengths and weaknesses of your sub.

For an overview of Japanese convoy lanes, see the map on pages 24 and 25. All of these convoy lanes are active in scenarios that occur early in the war. As the war propressed, and the area of the Pacific controlled by Japan gradually shrank, it became very difficult to find convoys in areas distant from Japan. In the scenarios that occur later in the war, it is easiest to find targets in the waters around the islands of Japan

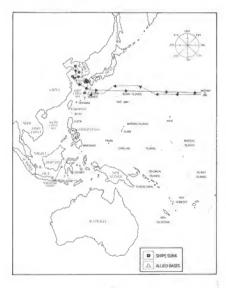




USS TANG - Midway Patrol, June, 1944

Radar, Electric Torpedoes with improved defonators, 400 - ft, hull

The USS TANG was the second leading submarine, with 2d contirmed sinkings between Feb. 17 and Oct 25, 1944. On TANGS third war part of her captain took her deep into the Japanese-controlled Yellow Sea. In a span of only fourteen days, she safe to enemy cargo ships, including four in one day! This unsurpassed achievement earned TANG the Precificantial Link Citation.



USS BOWFIN — Fremantle Patrol, November 1943

The BOWFIN, based in Australia, sank 16 Japanese ships under feut different skippers. The BOWFIN's second patrol took her from Australias through the Makasas Trait, to the Philippines After patroling fruitlesby off the Philippines, BOWFIN crossed the South China Sea to the coached waters of Indo-China. There she encountered two convoys and sank that ships in the course of three days in spile of a number of torged or orbitans.

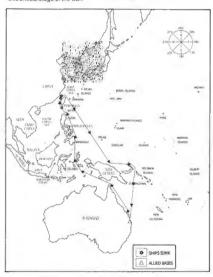


USS GROWLER - Second Patrol, August, 1942

Surface Radar, Steam Torpedoes, 300+ ft, hull

Cine of the first fleet-type submarines to enter the battle, the GROWLER was famed for the heroism of her captals, All Williamore. After a collision with a Japanese gunboat, Gilmore stylenger instructions divide although he lay badly wounded on the hidde. The processor was still to save his shin

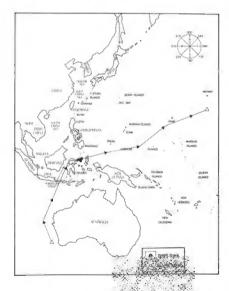
The GROWLER's second patrol as a new particle of the coast of Formosa she sank over 15,000 tons of she war, an excellent patrol at this critical stage of the war.



USS SEAWOLF - Seventh Patrol, October, 1942

Radar, Steam Torpedoes, 300+ ft. hull

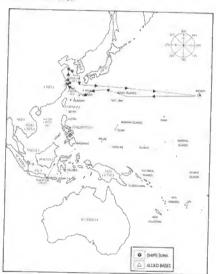
Another early arrival in the Pacific, the USS SEAWOLF went on to become one of the most successful subs of the war. Her second patrol included a memorable battle against a Japanese naval force off Christmas Island.



USS SPADEFISH — Second Patrol, October, 1944 Radar, Electric Torpedoes with Improved detonators, 400+ ft. hull

The SPADEFISH entered the fray late in 1944. At this point in the war most Japanese escorts were equipped with radar. In spite of her late start, SPADEFISH sank 21 vessels for a total of 88,000 tons.

On her second patrol, two weeks out of Pearl Harbor, SPADEFISH happened upon a heavily ascorted convoy in the East China Sea. After persistent tracking, SPADEFISH sunk the heart of the convoy: the 20,000 ton escort carrier Jinya.



SUBMARINE TACTICS

A successful submarine attack was very much a team affort by the entire submarine crew, with the capital infracting. The topedomen and meanmais mates maintained the torpedoes and enginer. The soundman lighered meemy ships through sensitive underwater hydrophones. By counting proposed revolutions and rotating the hydrophone, the soundman could estimate the enemy's speed and bearing. A radar party tracked the enemy of S. Surface value in the conning tower, the tracking party plotted the submarine's position and the position of enemy targets and except so nice attack plottings. The identification position of enemy trategis and excepts on the restrict plotted the submarine's production of the proposition of enemy targets and except so in the capital plant is a fine capital ca

At the focus of this activity, the captain media the crucial decisions which spelled the difference between success of failure. Carefully sweighing the number of escorts, the types of ships, visibility, water derth, number of torpsicose fereining, battery charge, the convoy's course and speed he decision how, when any where to attack the near.

With heir low surface profile and ability to submeke, shealth and submike were a vital ingredient in all submarine attacks. Once it snewny selp or conjety had been spotted a successful attack required a well thought of supmouth to lepting a few thousand yards of the enemy withous being plate of supmouth to lepting a few thousand yards of the enemy withous being that cells supmouth of the plate to peed a aiming and thing; and the clever use of speed, depth, and water temperature to evalue the inevitable counterattack.

THE APPROACH

The first priority upon sightling an enemy convoy was to determine its course and composition. At this point the decision to attack would be made. Next, the captain would direct his subto a position shead or on the beam of the convoy while remaining undecleted. During detected burning the convoy come into firing range. At right a surface stacks was called for atthough visibility varied greatly with heave monolight. During the dever drust hour the periscope was usable but the submarine remained difficult to see, making this and interest of the development of

The key to the approach phase was to achieve a feworable firing position without being detected by the enemy is escorts. As a resid of the submarine's allow underwater speed, much of the maneuvering during the approach had to be conducted on the surface, which made the sub-unlerable to detection. US ratiat could detect ships at a range of 16,000 yards (8 miles) or more. This generally gave the submarine the inlight was upaneous lookouts might see a sub at 10,000 yards during the day or 3,000 yards at night. When submerged, passive (listening) sonar could track Japanese ships at up to 16,000 yards, although in this range lessmed quickly if the sub-was moving or 4 depth. Japanese sonar could detect a rapidly moving figged for silient running, in 5000 yards, although at maximum depth and ranged for silient running, in 5000 yards, although at maximum depth and ranged for silient running, in 5000 yards, although at maximum depth and and escape the captain would attempt to mind the mind of the control of the control of the submaring day and included the smallest sonar target to the enemy submarged, a minimum profile provided the smallest sonar target to the enemy

SUB	DETECT (10 kr	ION TABLE lots)	
		DAY	NIGHT
SURFACED Full Profile Minimum Profile PERISCOPE DEPTH	YARDS	20000 8000	3000 1000
Full Profile Minimum Profile	ANCE	6000 2000	2000 800
SUBMERGED* Full Profile Minimum Profile	DISTA	2000	2000 800

[&]quot;If the submarine was under a temperature gradient layer, the sighting range was substantiativ tests

TORPEDOES

Primary submarine armament consisted of six torpedo tubes forward and four tubes aft. A total of 24 torpedoes were carried: 14 forward and 10 aft. A torpedo reload required about 10 minutes.

The Mark 14 steam torpedo had a range of 4,500 yards at 46 knots. In order to protect the submarine from permature defonsion, the warthead was not armed until the lorpedo had travelled 450 yards. The Mark 14 was propelled by steam generated by a spray of water passing through a torch of burning alcohol. This left is trail of bubbles on the surface which pointed back towards the firing submarine. Torred steering was controlled by an internal province.

These complex devices suffered from a number of severe problems. Cheel among them being the lendency to run too deep, thereby passing underneash the target, and the tendency of the Mark 6 exploder not to explode on contact with the target. Both of these problems were eventually corrected as the war processed.

In late 1944 the Mark 18 electric torpedo was introduced. This weapon ran slower than the seam lorpedo, 30 knots. However it did not produce the tell-tale bubble stream of its predecessor. Sub-commanders were no longer forced to escape after the first torpedo salvo. Under ideal conditions, ship after ship could be surik as the escorts circled franticulty searching for the unseen attacker.

Most torpedoes were therefore fired at a range of 1,000-3,000 yards. The best torpedo track was one which was perpendicular to the course of the target ship. This provided the largest potential target area. Head-on shots or stern shots were unlikely to hit their target.

TORPEDO DATA COMPUTER

Contrary to popular belief, the captain did not estimate an amount by which to "lead" the target. US submarines used a Torpedo Data Computer (TDC), an early-model analog device. The TDC, when fed with the target speed, range, and course, automatically calculated the correct torpedo track. The TDC calculated and fed the dryn anale directly to the gryoscope which steem that his horseful.

The gyro angle calculated by the TDC was based on the target's maintaining a constant course and speed. The captain would often aim slightly ahead or

behind the target ship if he expected a particular change in course. Frequently a "spread" of torpedoes was fired by siming one torpedo slightly shead of the target, one torpedo directly at the target, and one torpedo slightly behind the target.

In this simulation the gyro lead angle is automatically added to your perisoops bearing when the torpedoes are fired. Example: you have an enemy ship centered squarely in your crosshairs, bearing 080 degrees (due East). The target is on a course of 180 (South). The TDC calculates a gyro angle of 10 degrees. If you fire a torped of with assume a 100 degree track; (your 090 degree perisops bearing plus 10 degrees gyro angle) and should hit the target. In the same situation, If your perisoops is pointed at 080 (slightly behind the larget) your torped own will assume an 095 track (85 * 10). This torpedo should pass behind the target but may hit if the trineet is not 7.00. This torpedo should pass behind the target but may hit if the trineet is not 7.00. This torpedo should pass behind the target but may hit if the

If was important to make the first set of torpedoes count. Once the torpedo tracks were spotted, the convoy would begin to zig-zag radically and the escons would chare in on the subs position.

The captain's role during the tining procedure was to call off range, bearing, and angle on the bow information which will say the TDC and to select the moment to fire the torpedo(es).

DECK GUN

Most US subs were equipped with a 4 - limit "1" is a 1, bit gun had a range of yor to 8,000 yards and a lainty rapid rate of 6% 20 - gat effectively used, the deck gun was effective in sinking badly darkey 8 regions to 10 stow a ship down and force in to fall behind the corrowy. The gun was also used as a last ditch measure by subs which had been forced to surface or had suffered too much demande to dive safely.

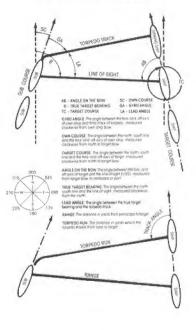
The gun may only be fired when your sub-is on the surface. Use the crosshairs on the perscope-binocular screen to aim the gun. The range is a utomatically set to the TCC range of the target at which you are aiming. Use the "" and "" keys to add or subtract deflection from this range. Example, an 18 knot destroyer coming directly lowards you from 4,000 yards away will move over 200 yards in the time it takes the shell for each the singer. Therefore you should use the "". Key to select a deflection of "200 to 250 yards before firing the gun. At 2,000 yards have feel will be found to the property of the shell will be the property of the shell will be the shell ands, if the shell his its larget, you will see and hear the explosion. You run is a supplied with 100 shell.

ESCAPE

If idencined by enemy escorts, escape became the sub's main objective. A submarine was no match for even a single destroyer in a gun and ramming duel. The usual tactic was to dive as deeply as possible and rig foreighed princing. The enemy escort would circle over the last known position of it's existratine, hoping to pick up a sonar echo from the submarines hull. Maintaining a microarrant profile and minimum running noties was opecally important under these incircular profile and minimum. Leaking fuel or machinery damage made the genoral soft of the enemy's sonar. Leaking fuel or machinery damage made the genoral's glob desire. Submarines gained some benefit from their tighter turning circle and softly to containly track the escorts propeller noises. Under extreme circumstances, a sub might try to convince the attacking destroyers that it had been destroyed by reteasing oil and debits within floated to the surface.

At night the sub's 20 knot surface speed was sometimes sufficient to outrun pursuing escorts.

TORPEDO FIRING TERMINOLOGY



JAPANESE CONVOYS

Japanese shipping generally travelled in small convoys of three to seven ships. Occasionally, cargo ships and warships might travel alone. As the war progressed and Japanese losses mounted, increasing numbers of excepts were assigned to these convoys. Convoys may consist of cargo ships, troop ships, tankers, and retestinger experts.

Tankers were the most important target class. The Japanese were critically dependent on the flow of oil to keep the Main Battle Fleet in operation. Troop stips were also important targets. These ships transported troops to and from their far-flung island conquests. You are more likely to find these valuable ships amond the shipping langer with hard fliered to Japan.

Cargo ships represented the majority of Japanese shipping. They conveyed supplies and equipment to and from the Japanese homeland.

Escorts came in two classes, destroyers were often used for escort duly, especially in important corroys. The Japanese also constructed a special class, of escort for anti-submanne defense: the "kaibokan". Both destroyers and kaibokan were armed with guns to engage submarines on the surface, sonar to detect submarines below the surface, and depth charges to sink them. A submarine on the surface could outrun a Kaibokan, which had a top speed of less than 20 knots. Destroyers could steem at close to 30 knots.

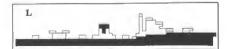
A twisting, speeding, shallow-draft escort was a very difficult torpedo target, although a single hit was generally sufficient to sink one.

Japanese convoy traffic tended to concentrate along the routes between major ports. Refer to the convoy route map for details.

JAPANESE TACTICS

Japanese escorts were formidable opponents. Their optical and sonar equipment were of excellent quality and Japanese gunnery was outstanding. The primary deficiencies were depth charges which tended to be set too shallow and the lack of surface radar until late in the war. This encouraged the night-surface stack and deep submeragence as an ewasten technique. The Japanese side had a tendency to give up the hunt once contact was jost, although some experienced seconds showed more presistency.

The goal of the escort was to sight an attacking submarine and to destroy or tive if edep before it approached forgedo firing range. As the secont sweet back and forth across the path of the convoy, tookouts constantly scanned the seas and sonar operators searched under the water for the felhals eithouette, personge feather, or sonar echo which betrayed the sob's presence. If a sub was sighted, all excorts charged the sub at maximum speed. An enwary sub might be caught near the surface and destroyed. A quicker advertany could still be forced to dive deep, removing it as a threat to the convoy. Once a sob bad been driven under, the escorts circled the list signifing, hoping to establish sonar contact and conduct a definit charge attack.

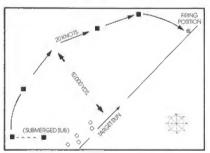


The diagrams below will provide some sense of the combat situations faced by submarine captains. These are by no means all of the potential situations which you will encounter. They are presented here as examples of real-life submarine tactics and to assist you in surviving the myriad dangers of undersea, pombat

Situation 1: END AROUND ATTACK

You are at perisoope depth and have just sighted a 10-knot convoy bearing 090 degrees (due East). You determine the ententy's base course to be 045 (Northeast). It is around noon seven hours of daylight remain. The convoy is escorted by at least one destroyer. Your toppedo tubes are full and your battery is fully charged. What is your plan?

This is a difficult situation: the convoy is steaming too fast for a submerged approach. A cautious skipper might leave this convoy alone and look for easier game. A foothardy captain might charge in for a stern surface attack, but a surfaced submarine is no match for a destroyer during daylight.



The experienced skipper would probably by the "end-around" factic. Turn and proceed submitted sway from the convoy until you are out of visual signifing range—about 19,000 yards opending on the visibility. Now surface and use maximizing speed to schleve a position ahead of the convoy, taking care to stay out of visibility spindy arroad the convoy and heads in your direction, you have probably been signified—direct immediately. It may take some time to carry out this maneuver, use the time scaling feature to speed up the simulation. Once you are in front of the convoy; to come by our Make your torpedoes count! Note that this situation is similar to the USS SEARAVEN scenario.

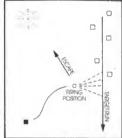
SUBMARINE TACTICAL OPERATIONS -

Situation 2: NIGHT/SURFACE INTERCEPT

You are patrolling on the surface when radar picks up a convoy bearing 045 (NorthEast). It is a dark and hazy night. Radar determines the enemy's base course to be 180 (South) at 8 knots.

Two "kaibokan" escorts appear to be leading the convoy. What do you do?

This is an excellent set up. You are ahead of the convoy and visibility is poor. Your primary consideration should be to avoid detection by the escorts as you approach the convoy. Use moderate speed and keep your bow pointed towards the escorts as much as possible. This provides only a small visual target for the enemy lookouts to detect You should be able to reach an ideal firing position off the convoy's beam at a range of 1,000-2,000 yards If you time your approach when the escorts are busy



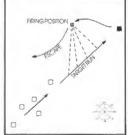
on the other side of the convoy, you may be able to escape on the surface: the "karbokan" can only turn 18 knots. Good Luck! (Note that this situation is similar to the LISS HAMMERHEAD scenario.

Situation 3: DAYLIGHT/SUBMERGED ATTACK

During a routine day periscope sweep you observe a convoy heading directly towards your range 4,000 yards! An escort is in the lead and four cargo ships follow in our cargo ships follow in our cargo ships follow in our cargo ships follows:

37

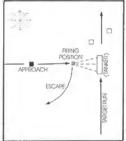
You should immediately head perpendicular to the convoy's track to out yourself into a favorable firing position for a broadside torcedo shot. Since you will be turning your broadside to the enemy you should dive to reduce the chance of sonar contact. Once in firing position, wait until the two middle ships give you an "overlapping" target Torpedoes which miss the closer ship then have a good chance of hitting the further ship.



Situation 4: AVOIDING ENEMY ESCORTS

You have just foosed three steam torpedoes at a particularly juicy tanker. The two escorting destinoyers have not detected your presence. You are at periscape death during deviaght.

It is extremely terroting to watch your tornednes as they head towards the target. You will only do this once! As soon as your torpedoes reach their target. the buthle trails will nount directly to your finne opsibon, At 26 knots, the destroyers will be there quickly. You must get away immediately. Head away from the destroyers at maximum speed, dive as deeply as possible. If the destroyers get close, minimize your speed to reduce noise Two escore can be very dannerous, as it is usually impossible to present a minimum sonar profile to both ships.

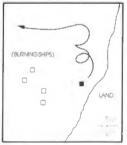


Situation 5: SHALLOW WATER ESCAPE

You are in trouble! Behind you three cargo ships are burning from a wellplanned torpedo salvo. But an angry escort is charging towards you. The constant

pinging leaves no doubt that you have been detected. To make matters worse, you are close inshore in less than 100 feet of water! What now?

You are probably in for a long afternoon. At this depth, a depth charge attack might well be fatal. Your best bet is to use your sub's tight turning circle to prevent the escort from getting directly overhead Follow him on the attack. plot map: try to anticipate his maneuvers. Use maximum forward and reverse speeds to dodge him. Whenever you get a chance. head out towards deeper water - it is your only chance for escape



PLAYING TIPS

There are numerous books relating to World War II submarine warfare, many written by actual participants. Reading one or two of these should give the player an appreciation of what it was really like. This simulation has been designed to present you with the same types of situations and to let you use the same tactics you will mad about.

Make sure you understand the role of the Torpedo Data Computer — most torpedo shots should be made with the penscope crosshars directly on your target. If you really want TO LEAD the target, slept cet the "Enter Angle-on-Bow" reality level and leave the gyro angle at zero. Now your torpedoes will always track in the direction your scope is pointing. You now must point and shoot the torpedoes like a gun, is, you must estimate the amount of distance the target will travel trom the time you life the torpedous hit airwise Interpretating of the shoot. You then lead the target by that estimated amount, (Under normal modes the TDC will not his advantage and the stage the stage that the stage th

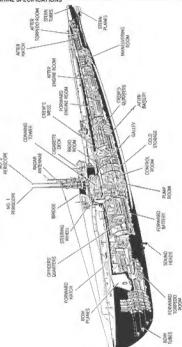
During WWII the Capatain had not only to call off the range and bearing but also estimate the Analge on-the-Bow. Although in this simulation the TDC calculates the angle, you are welcome to enter it using the "A" key and the joystick or mouse. You should study the accompanying diagrams for an exact explanation. However, a good way to estimate this angle is to use the "enemy capatain" method. Imagine yourself on the bridge of the enemy ship boxing howward. The angle left or right from the bow of the enemy ship where the enemy captain would see the submarine is the Angle-on-the-Grow. For example, if the enemy capatain was shown as the submarine capatain you would assuming you chose the Angle-on-Bow For shealty Level it per a "and move your control until the angle reads" - 405 degrees. As you can see, this is an estimation procedure by using this procedure, you are thying to so keep the qualitor GYPO LEAD ANGLE = ArcSine (Target Speed x Sine (Angle-on-Bow)/Torpedo Speedit in your head Tricks, and

Make sure you understand the distinction between SEARING and HEADING BEARING is the direction in which your scope/binoculars are looking, HEADING is the direction your sub is tacing. Note that it is generally much faster and easier to aim your forpedees and gun by rotating the scope (changing your BEARING) rather than by steering the sub (changing your HEADING).

In general, you should plan on making a submerged attack in daylight, and a surface attack at night. During dawn and dusk you can try both.

Submarines were not designed for extended gun dualis and did not incorporate sophisticated range inding devices for their design. Four host bet is to try to achieve a position directly to the side of your target which allows you to use no range defection in the larget is whether approaching no reneating). It this is not possible, try a number of tranging shots at different range defection. Once you hit the target which is among short or commence reside figure.

Most importantly, try to anticipate your opponent's maneuvers and reactions. In general, you will know more about his location, course, speed, etc. than he knows about you. Use this advantage to plan and execute the most destructive and least dangerous attack you can devise.



CAPABIL

The US Fleet Submarine of the Second Section 2 and noutstanding weapon. With 200 trace of trieset fuel and a cruising. Section 3.4. Bell Writine, no area of the Pacific was safe for enemy shapping. Four disease lengines produced 6.400 horse-power for a maximum surface speed of 20 knots. Battery driven electric motors provided submergred propulsion at up to 10 knots for short periods. The rated test depth of the first fillest updamines was 300 fleet, while later rott were rated for more than 400 feet. Soft were capable of somewhat greater depths under energency conditions.

STANDARD EQUIPMENT

The WWII fleet submarine incorporated a variety of navigation, detection, and fire control devices.

The periscope could be used for visual observation to a depth of 44 feet.
The scope provided target range and bearing information to the Torpedo Data
Computer.

Surface Radar could be used on the surface or at periscope depth. SJ surface radar had a range of up to 16,000 yards

Passive (listening) sonar became the primary source of information when submerged. Experienced sonar operators could determine ship speed, bearing, and estimated range up to a distange of 6 000 yeards.

EQUIPMENT INNOVATIONS

At various times during the war, significant new equipment and factics were introduced.

November 1942: US submarines were equipped with surface radar. This allowed enemy ships to be detected at ranges of up to 16.000 yards. Prior to this time, visual subhines and sonar were the only means of detecting enemy ships.

April 1943: The Japanese increase the escort strength for their vital tanker and trop ship convoys. All such convoys now contain at least one escort. August 1943: A new stronger pressure hull on US submarines increases the maximum safe death from 300 to almost 425 feet. This chance was unknown.

to the Japanese who tended to set their depth charges too shallow. September 1943: An improved detonator is litted onto American torpedoes.

greafly reducing the incidence of "dud" torpedoes

January 1944. Mark 20 Electric torpedoes are introduced. These "wakeless" torpedoes a submarine firing torpedoes.

but their relatively slow 30 kinds speed requires a good close-in attack position. July 1944: The Japanese introduce radar on their escort vessels, making surface attacks moch more difficult.

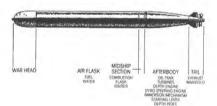


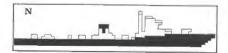
SUBMARINE WARFARE IN THE SOUTH PACIFIC

The American fleet submarine was a complex and formidable wer machine, ideally suited for the vate reaches of the Pacific and the for-flung Japaniese convoy routes. American submarines developed an aggresse of outrie which frequently rook them into the heavy travelled when coast of Japan. Sub-skippers vield to surpass seach other in ships and set like coast of Japan. Sub-skippers vield to surpass seach other in ships and set like coast of Japan. Sub-skippers vield to surpass seach other in ships and set like coast of Japan. Sub-skippers vield to surpass seach other in ships and set like coast of Japan. Sub-skippers vield to surpass seach other in ships and set insight of the sub-commanders were also charafterined as the pressures of underseas warrance weeded out the peacetime sailors and forged an elike cadre of young, aggressive, and skillful capsains.

The history of submarine warfare in the Pacific is the story of these men and the highly trained crews they led. Each partol, each attack was a personal confrontation between these men and a skillful and determined enemy. The Allied victory in the Pacific was in no small measure a consequence of their overwhilming success.

TYPICAL TORPEDO





U.S. SUBMARINES IN THE SOUTH PACIFIC

EMERGENCE OF THE U.S. SUBMARINE: Operational submarines date back to the time of the American Revolution, but it was not until the Second World War that the "Silent Service" came into its own as an essential part of the American armed forces.

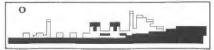
Early, afforts at submarine combativere beset with many problems. Submarines were deployed during World War. Lost saw little action. The years that followed brough limited budgets, limited interest and U.S. sub-development became a low providy item. The Japanese military, in contrast, nad been constantly at wis since the beginning of the 1939s. They enjoyed superior weapons and numbers, and their trops were battle-tested and combat ready. The Japanese shall be afforted to the Combatility of U.S. carriers and came close enough to the American West Coast to shell several tracests been including to a Sanates.

several ratigets (neter, including Los Angieres.)
Japanese leaders were not inflatible. Those leaders with first-hand knowledge of the wast industrial potential and internal resources of the U.S. were ignored by the majority of the Japanese military siller – a fast lapso for a small island nation, heavily dependent on a villal shipping role. The Japanese also underestimated the strength and range of the 1950s windigs Annercan subst, which were nearly a moth for the Japanese I – boths at the beginning of the war. Compounding this and the form the Japanese I – boths at the beginning of the war. One pounding this and the latest of the Japanese in the second of nove costly at the war progressed, and the Japanese military would not acknowledge the growing proficiency of the LIS sufmenses and the men who commanded them.

The early days of WWII undoubtedly reinforced the Jappenius subsect is superiority. The inexperienced dismriscan sub fleet got of the 3-dischables fellor, superiority. The inexperienced dismriscan sub-record to the sub-record sub

DEVELOPING SUBMARINERS: Command inertia was not the only problem. It became clear that the special rigors of submanine service required a special capital and crew. The special situation of submanine service called for a different class of fighting man Stem disciplinarians were not necessarily the best commanders: an aggressive and flexible kind of Isader was needed to handle the myrad of situations a submanine fasced. As for those of the crew, a more stolic, "get the job dome" emballar proved more valuable in the tense conditions of sub-variant than cowboy bravado. An understanding of submanine psychology was a large stem forward in improving submanine success.

TORPEDO TROUBLES: The lack of an effective and reliable torpedo plagued American forces throughout the war, initially the poor showing of subs in combat with the Japanesie was attributed to human error. Some naval officials, as well as the Bureau of Ordnance, had fully supported the Nark XIV torpedo and its



SUBMARINE WARFARE IN THE SOUTH PACIFIC -

Mark VI exploder. The Mark VI incorporated a magnetic defonator in addition to the conventional contact detonator in order to increase the torpedo's effective. ness against large, heavily armored craft. Laboratory testing proved very successfull but in actual combat situations, a chorus of complaints arose from subcommanders from across the fleet. An impasse arose with the torpedoes builders and backers on one side and the sub captains on the other. These cantains claimed the torpedoes were running much deeper than they should, missing the larget. When they did stay on course, the torpedoes often exploded prematurely or failed to explode at all. The Bureau of Ordnance continued to blame the performance of the sub crew for the problems, despite mounting evidence that something was indeed wrong with their torcede, Oace thorough testing was rional ataulty firing our mechanism was discovered. When the torpedo had struck its target dead on, the firing pin was crushed lassich a way that it could not trioner the explosion. Ironically, perfect sighting had usually resulted in a poor performance record for the submarine crew. Once the crastism was conceded, the subfleet was held in higher estrem by those incommand, As performance levels rose so did the morale of the submarine crews. Even so, the performance and scarcity of torpedoes hampered sub operations throughout the war.

THE BALANCE SHIFTS: By 1943, the balance of Pacific power was shifting to the Americans' lavor. Broader comball experience and more effective substand torpedoes were gradually putting the U.S. on the offensive to the first time. The Japanese remained a dangerous enemy—retaining an edge in experience and torpedo technology that they would keep throughout the var. Shift, the lack of internal resources was taking lights[3]. Time earlier successful conquests had strung the Japanese forces on this fisting its dark of the Pacific, making their convoys of supplies evert/time important to approximate ones.

Failly half of Japan's 6.002500 tons of shipping awns required just to sustain that civilian population. U.S. forces gradually stack, sown Japan, choking off the sightly arteries expanded for the Japanese way afters. Attended substank health 3.020.000 tons of Japanese shipping, nearly spirit of expanded they had at the war's beginning. By the chare of 1944, U.S. 50455 comparable 30 in a facility with Army Air Corps 20 mbers and carrier planes, U.S. subs could strike at will in nearly every corper of 1945, Japanese seming.

The Japanese continued to sealer from a shrinking force of capable lighting manyard morals, was chipsed by continued nombing of the Japanese homeland scapping that warrons had promised weeth ever come to pass.

The Japanese forces were after denger; we but their grip on the Pacific was tree coally broken. The question in symmetry time and lives yet lost remained, but American victory was now a persenty.

The wat in the Pacific was the pureble which transformed the American automorphism from a vagle conception of the safety was time as full-fleedged and eventually invalidate proposent of the American amend services.



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BARB	96,628	11
TANG	93,624	24
SHURRIDES	90,080	22
SPADEFISH	180,091	2
INGGER	86.552	18
DRIM	80,580	15
JACK.	76,687	15
SACOK	75,473	17
TAUTOG	72,608	28
SAHORE	72,529	20
GUMBDPSH	72,434	19
SCAWOLF	71.608	18
Фировом	71.047	61

DESIGNER'S NOTES

World War II submarine combal identifies and the manner in which it combines through planning, paid splitts, fixed, splitt, splitt, and in endlessly varied environment. Our initial research convinced us that this was an eardlessly varied environment. Our initial research convinced us that this was an eare which was ideally suited to the characteristic strengths of computer simplestions. Our primary goal was to achieve a level of detail, realism, and variety-beyond that of other simulations product without sacrificing exhaulting.

The first major component designed and implemented was the mapping system. As you play the simulation you will realize that any area in the entire Western Pacific can be displayed down to a resolution of 100 yards, with a corresponding (sigslay) of islands and land on the horizon of the bridge and perisoped displays. In addition, shallow waters and shoats are included as well as complete convey routing information to and from the Japanese maintaint. To squeeze all of this information into a 64K computer was a major challenge. However, we feel that the almost infinite variety of situations available and the freedom to select your own mission route and particle researchly statistics.

Another major obstacle to a playable simulation was the time factor. Actual submarine engagements could last many house, occasionally for days, as the captain maneuvered for an advantageous firing position and his opponents zigged and zagged and zagged to confuse him. However once the action began in earnest topped runs were timed in minutes and seconds: as well aimed depth charge attack could swallow up a submarine with one devastating systesion. One solution might have been to adjust sightling ranges, movement scales, turning rates, enc. to produce a "batilitus" simulation with confusious broped firing, depth charging, and franch maneuvering. Flowever this would have negated contributed using posits. Instead with implemented a time scaling by system which allows the player to accelerate the progress of the simulation while maneuvering tor position and stiff confusion to accurately track all activity.

This simulation actually maintains two distinct "points-of-view" as the situation develops. The computer continuously tractical ability, torpedores, and your sub. This information is then filtered to provide the player with the sub commander's "point-of-view" information which is not available to the sub-commander's hidden (enemy ships which are out of range, the enemy's base course, etc.). The computer also constructs a "point-of-view" for the Japanese escorts and cargo ships— only providing them with the information which they would are stellar know.

Finally, we included an almost endless variety of situations, options, and play variations. On patrol missions you will encounter large and small conveys; escotted and unescorted conveys; shallow waters; day, dusk, and night attacks, and a limitiess variety of sactical problems. Each of the reality levels adds a new consideration into your planning and decision making. Equipment variations also require solinificant sactical addustranes.

The most satisfying aspect of designing and testing this product was the opportunity to learn and use realistic submarine lactics: "Cookbook" solutions will not handle the immerse variation of teatical problems the aggressive sub-captain will encounter. Each situation must be analyzed based on an appreciation of the same lactors which influenced real-life size hereon when the product of the same lactors which influenced real-life size hereon products.

The most satisfying aspect of designing and testing this product was the opportunity to learn and use resiliate submarine tactions. "Cookbook" solutions will not handle the immense variation of factical problems the aggressive sub captain will encounter. Each situation must be analyzed based on an appreciation of the same factors which influenced real-life sub encounters.

We hope that you, too, will find yourself accepting this simulation as more than just an artificially constructed "geme". If you can feel a twingle of apprehension as depth charges roll into the waller above you, a glimmer of satisfaction as your toppedose find their target, or a spack of anticipation as you embark on your next part of then our reforts have not been in vain. We hope that the experience of playing this simulation will be as enjoyable and rewarding as was the process of design and develonment.

Good Luck and Happy Hunting!

CREDITS

DESIGN and DEVELOPMENT.

Sid Meier

COMMODORE 64:

Sid Meier

APPLE: Jim Synoski

ATABLXL/XE:

Randall Masteller

IBM/TANDY:

Randall Masteller

ATARIST:

AMIGA

Russell Finn

GRAPHICS

Sid Meier, Michael Haire

DOCUMENTATION: Sid Meier, Michael Haire, George Geary, Bill Stealey, Lawrence Schick

PLAYTESTING:

Stephen Byrne, Jay Trotta, Gerry McMahon

SPECIAL THANKS TO FORMER SUBMARINE OFFICERS

Frank Shakespeare U.S. Naval Academy, Class of 1953

Served on USS Requin, SSR 481 Gold Medalist, U.S. Rowing Team, 1952 Olympic Games

Alan R. Thornton

U.S. Naval Academy, Class of 1967 Served on USS Robert E. Len. 25 PN 609

COVERACT David Philips

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